

## Inspecting underground conditions... Visual Probe

*The INEEL-developed Visual Probe inspects the physical condition of buried wastes, containers, sludges, interstitial soils, and provides evidence of moisture and contaminant migration. It is one of several probes at the INEEL inserted directly into contaminated wastes to monitor and observe environmental conditions. The data it provides, combined with other probe data, can significantly influence environmental investigations and impact cleanup decisions.*



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*The Visual Probe about to be driven into buried waste (at right) enables an operator using a video camera to remotely observe and document subsurface conditions.*



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### **Why the need for this probe**

The INEEL Environmental Restoration Program needed to visually examine the environment in and around a buried transuranic waste zone in a safe manner.

### **What the probe does**

The Visual Probe is made of polycarbonate tubing—a clear glass like material, through which a miniature video camera is lowered to visually examine environmental conditions in and around a waste disposal area. The resulting video reveals the visual characteristics of soil, debris, and any waste that may come in contact with the probe tube.

### **Probe and operations description**

The Visual Probe is constructed of chemically resistant polycarbonate tubes, reinforced steel rods, and an internal steel cage that provides structural support to the probe and lateral support to a push-rod assembly.

The probe is driven into ground suspected of containing wastes, to a point of rejection by using a ResonantSonic™ drill rig. At the INEEL, the probe was inserted to 25 feet underground, just at the interface between the waste zone and the underburden.

The probe is designed to be narrow at the tip to provide a pilot hole for the remainder of the probe sections as they are added to the probe as it is inserted into the waste zone. This design feature reduces the compression load on each probe segment.

The internal structure acts as a spacer and transmits lateral pressures on the probe casing to the steel push rod while the probe is driven into the ground. Because of its steel construction, the internal structure tends to deflect less than the polycarbonate casing. As the probe is driven into the ground, the probe casing must remain intact to prevent an open pathway from the waste to



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*Photo of the Visual Probe's clear polycarbonate tube and internal structure.*

the surface. Pressurizing the entire probe string for each probe segment driven into the ground tests the integrity of the connections between the probe segments, and acts as a quality control measure. The probe string is pressurized to 5 psi, which must be held for at least 5



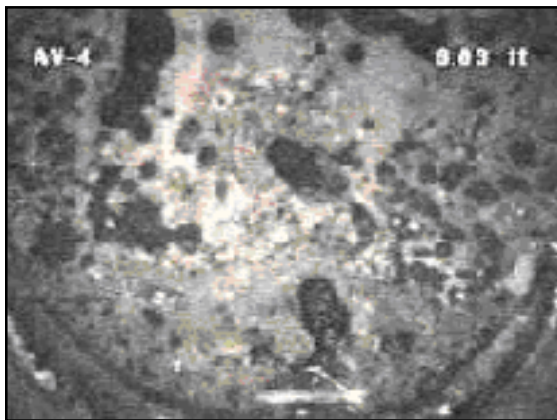
minutes. If the pressure decreases, it is assumed that the integrity of the probe has failed and the probe is grouted in place. If the pressure remains constant, the probe's integrity is proven and the next probe segment is added to the drill string and driven into the ground.

### **Data results**

The video data log can visually confirm the color, consistency, condition and texture of waste materials; and depth of the overburden, waste seam, and underburden. It can also show the presence of voids, sediments, moisture, and reflectivity—all important indicators that have to be considered during remediation activities.



*A field worker observes subsurface conditions as a miniature video camera is lowered through the visual probe.*



*An individual slide from a video log shows an example of the visual character of a subsurface environment at a depth of 8 feet.*

### **Benefits**

Subsurface data obtained as a result of using the Visual Probe includes the following benefits:

- Documents the condition of buried waste and provides a visual record.
- Increases worker safety by reducing exposure to contaminants.
- Reduces uncertainty in risk assessment calculations used to influence decision-making.
- Indicates water infiltration and potential for contaminant movement.
- Avoids environmental impact by not displacing contaminated soil.

### **Points of contact**

To discuss how the Visual Probe might apply to your needs, contact **Andy Baumer**, or one of the other references at the phone or e-mail address shown. The INEEL's *Technology Catalog* is another reference on new and innovative technologies. It's on the web at [tech.inel.gov](http://tech.inel.gov).

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